

NPIC/TSSG/DED-1652-69
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MEMORANDUM FOR THE RECORD

SUBJECT : Description of Technique for Obtaining Stereo TV

One of the simplest embodiments of this invention and one that is perhaps the easiest to explain can be seen in Figures 1 and 2. Referring to these figures, an object 1 is viewed by two television cameras 2 and 3. While camera 2 looks directly at the object, camera 3 looks at a reflection of the object as seen in the mirror 4. Camera 2 transmits via connection 5 to a television receiver 6. Camera 3 transmits its image via connection 7 to television receiver 8. Such cameras, receivers, connections, and means of employing them are well known to one experienced in the art. Cameras 2 and 4 can be positioned so the angle 9 subtended by their view is approximately in the range of angles subtended by an observer's eyes as he views objects in stereo. This angle may usually be between 1 to 30 degrees but can exceed these limits. The distance of the viewing path 10 should be approximately equal in length to the viewing path 11 and 12 so that the image size seen by both cameras are nearly equal. If these viewing paths are not equal then a magnification or reduction of one or both of the images may be required at the camera position or at the receiver position.

The observer then views the two images. He views the image from receiver 6 with his right eye 13 and views the reflected image from receiver 8 through a mirror 14 with his left eye 15. Preferably these mirrors should be front surfaced mirrors, but other mirrors will also suffice. The image, seen by the left eye, has been reflected from two mirrors and is thus a correct image of the object being viewed. The two images are thus seen by the observer's eyes in a similar fashion as if he were actually observing the object.

Obviously, the system could be transposed wherein camera 2 views a reflected image instead of camera 3 and the right eye views the received image with a mirror.

Other techniques are known to produce stereo TV but have certain disadvantages which this invention overcomes. Some systems use polarized filters for viewing but there is a considerable loss of image brightness (usually over 50 per cent) when viewing such imagery. Other systems require the viewer to maintain a relatively fixed position while looking through lenses that are in a fixed position.

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In the subject invention, the observer is free to move in respect to the television receivers. He may move closer or farther from them, he may move above or below the horizontal center of the screens or he may move to either side of the screens. By moving to either side of the screens, the viewing distance to the screen from one eye does not equal the viewing distance corresponding to the other eye. One image thus becomes larger than the other. As long as this size difference is small, the eye can accommodate it and adequate stereo images are realized. If the difference in image size becomes too large then the eyes can no longer fuse the images. In such cases, a reduction of the larger image or an enlargement of the smaller image is desirable. This can be accomplished by using a concave mirror (to enlarge) or a convex mirror (to reduce). The use of such mirrors is another feature of this invention. The degree of curvature of the mirror will depend on the amount of image size change desired.

The mirrors described in this invention can be affixed to a pair of eyeglasses or to a headpiece worn by the observer or they may be mounted on a stand remote from the observer. In either case, the observer has a considerable amount of freedom of movement. Other observers who do not desire the stereo effect may view either screen without using a mirror.

Another unexpected advantage of the invention is that it improves the quality of imagery perceived by the observer. Since the eyes see two images instead of one, the irregularities and omissions of one image are compensated by the other image.

Figures 3 and 4 show how a typical audience can be positioned to simultaneously view the images presented by this technique.

Figures 5 and 6 show other embodiments where only one television transmitter and one receiver are used. In Figure 5 the television transmitter's field of view is divided into two parts. One part looks directly at the object 1. The other part of the field of view looks at an image reflected by mirrors 16, 17 and 18. Since the viewing distance 19 is shorter than the viewing distance represented by lines 20, 21, 22, and 23, a concave mirror is used in the viewing path. In this case, the concave mirror is shown as 18 but could be one of the other mirrors. Lenses could be used in place of the concave mirror to achieve the required size increase.

A similar embodiment is shown in Figure 6, where mirror positions and locations can be chosen to make the two viewing paths equal and

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eliminate the need for changing image size. In the case of the embodiments shown by Figure 5 and Figure 6, the resultant images are both shown on one receiver but the principle for viewing them in stereo is the same as previously mentioned.

Figure 7 shows an embodiment where both television transmitters directly view the object but one transmitter reverses the image electronically so that the result is a mirror image of the object.

Figure 8 shows an embodiment where motion picture film or transparencies are projected onto screens, either from the front or the rear. One of the transparencies is reversed so that a mirror image of the correct image is projected. A computer generated pair of images could also be displayed on a CRT with one image being presented as a mirror image. Or an image could be computer generated, stored on video tape, played back an instant later, on a second CRT and viewed simultaneously with the real time image. In this case, the time delay between images could be adjusted to change the amount of stereo achieved. Other embodiments or revisions to these embodiments are possible and should be obvious to one skilled in the art. For instance, this technique can be applied to projection viewers and motion picture systems.



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